BLUETOOTH PHOTOCELLS

CRONOPIC **FB-5**

CRONOPIC

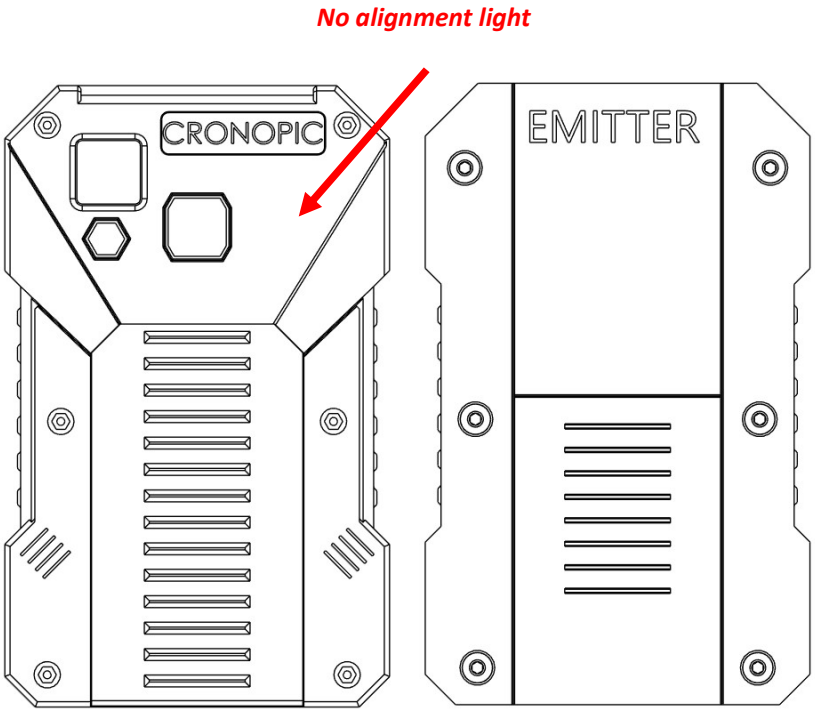
v1.0

These are the younger sisters of our well-known FB-3 photocells with much greater optical range, used in competitions of all kinds. The FB-5 have shorter optical range (about 4 meters), more than enough to perform your physical performance tests. Whether you need to evaluate your soccer, hockey, basketball team, etc., or you want to time yourself, the FB-5 are the ideal professional solution at an unrivaled market price.

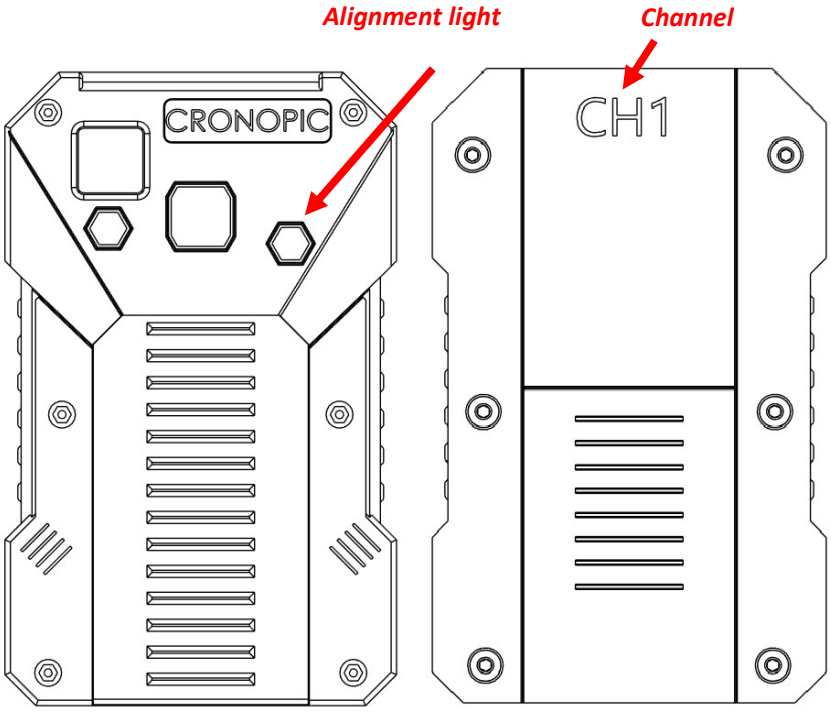
QUICK GUIDE

The *CRONOPIC* photocells consist of two devices, an emitter and a receiver. When aligned they create an invisible infrared barrier that sends a bluetooth signal every time it is interrupted by an object. The bluetooth signal is sent to your mobile device capturing the athlete's time in our PROBATIO app.

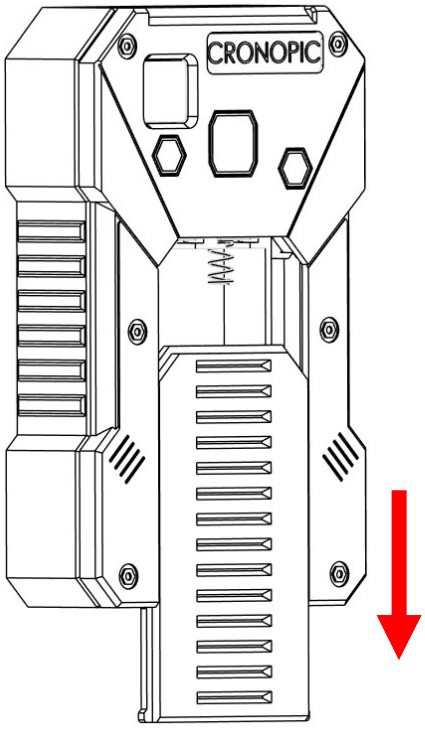
1. The *emitter* is the one that sends an infrared signal to the receiver. It has no alignment light, and you can read "EMITTER" on its back::



2. The *receiver* is the one that receives the infrared signal and sends the time cut via bluetooth to the mobile device. It is distinguished by having an alignment light and its channel number is specified on its back::

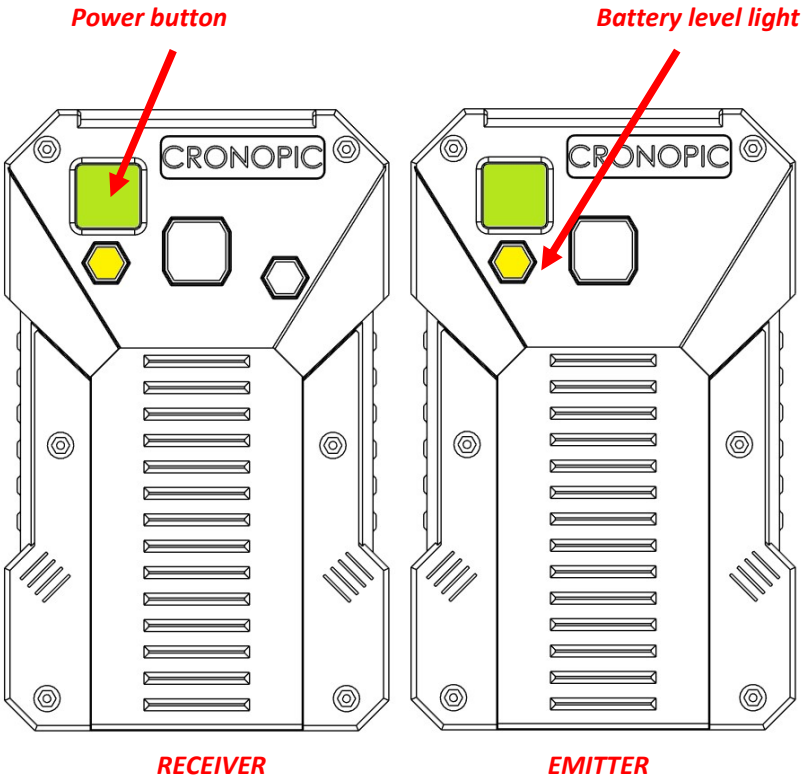


3. Remove the cover and place two AA batteries (alkaline or rechargeable) in each one::



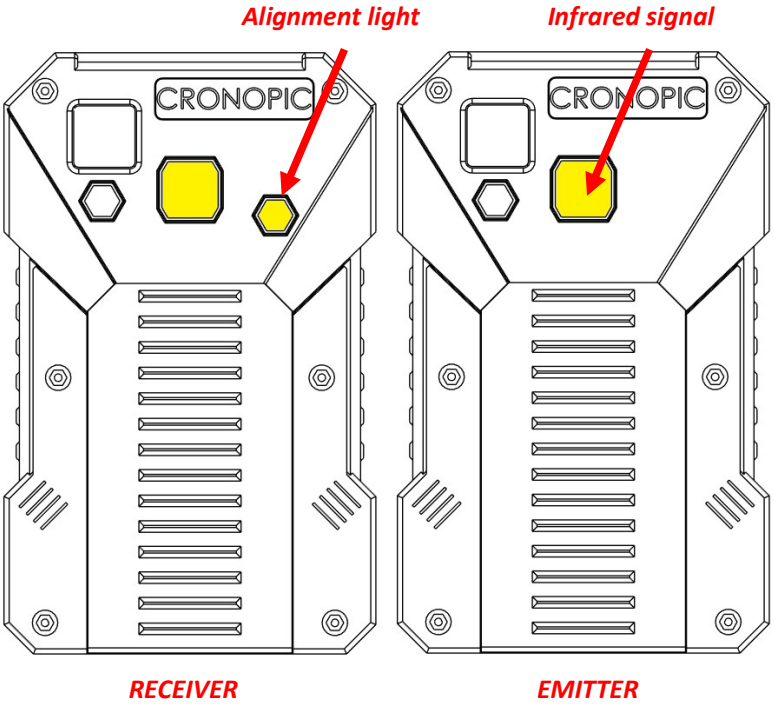
MARK YOUR BATTERIES IN PAIRS (for example, the two that go in one emitter with one line, the two in the receiver with two lines, the two in the other emitter with three lines, etc). This way you will avoid mixing them. A discharged battery together with a charged battery can cause erratic operation, even making the device turn on and off intermittently.

4. Turn each one on with the white button. A blinking yellow light should turn on in both:

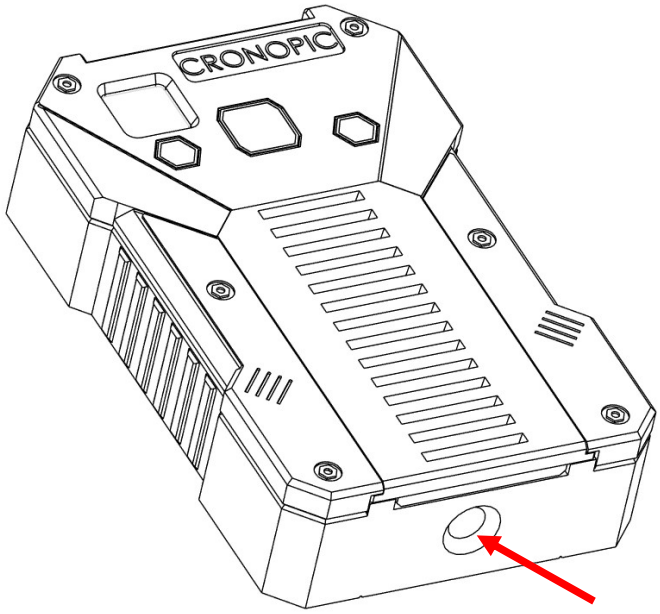


The blinking speed indicates the battery level as explained later.

5. Additionally, when you turn on the receiver, its alignment light will also turn on. This will turn off when the receiver and emitter are aligned:



6. Mount the photocells on standard photography tripods or any coupling with 1/4'' thread::



7. Now, after you align both devices (alignment light off) when something crosses the invisible barrier, the alignment light will turn on and the receiver will transmit a bluetooth signal to your mobile device. Test it by interrupting the barrier with your hand.
8. If you are testing the photocells inside your house, increase the separation between the emitter and receiver to at least 1 meter, to better simulate their use, since due to the high signal power and infrared beam bounce off walls and surrounding objects, the sensor may not cut unless you interrupt it with very thick objects like your hand or arm.
9. To use them with your phone or tablet, enable the Bluetooth function on the device and follow the steps in the PROBATIO app video (you can view it by scanning the QR code inside the case).

BATTERY LEVEL INDICATOR

1. The light on each photocell indicates the battery level. The following light code will allow you to know the battery level in two cases:

a. Alkaline batteries (shows two levels)
b. Ni-MH rechargeable batteries (shows three levels)

a.

Very slow blink (once every four seconds) -> High level

Slow blink (once per second) -> Low level (replace batteries)

Fast blink (three times per second) -> Dead batteries

b.

Very slow blink -> High level

Slow blink -> Medium level

Fast blink -> Low level (recharge batteries)

BATTERIES

The batteries last more than 70 hours for the emitter and more than 180 hours for the receiver. This is using good quality alkaline or 2000 mAh Ni-MH rechargeable batteries (duration could decrease drastically below -5°C). The operating voltage ranges from 2.2V to 4V. Don't buy cheap rechargeable batteries because they could be fake copies. We recommend SONY CYCLE ENERGY, PANASONIC ENELOOP, and RAYOVAC batteries. Pay attention to capacity, a 2000 mAh battery will last twice as long as a 1000 mAh one. But don't trust high capacity batteries over 3000 mAh, because they could be fake. Rechargeable batteries will have a longer lifespan if you use them at least once a month and store them between 60% to 80% capacity, that is, neither fully charged nor fully discharged (otherwise, we recommend using alkaline batteries). Ni-MH rechargeable batteries do not need to be, nor is it recommended that they be, fully discharged before charging them.

CHARGERS

If you use rechargeable batteries you will need an appropriate charger. There are three types of chargers::

a. Slow chargers
b. Fast chargers
c. Slow chargers

a. Slow chargers:

They charge the batteries for about 10 hours and then stop, regardless of whether the battery was previously charged or not. Do a full charge only if the battery level indicated by the photocell is at low level, otherwise do a half charge (5 hours for example). If you do many full charges without the batteries being at low level, you can reduce the battery lifespan.

b. Fast chargers (less than 5 hours):

We do not recommend these chargers because it is even easier to overcharge the batteries than with slow chargers if you don't pay attention to the previous charge of the batteries.

c. Smart chargers:

They charge only what the battery needs and in a fast and individual way, so they cannot overcharge them. Recommended if you have many photocells and need to charge them quickly and safely. We recommend the "Intellicharger" line from NITECORE.

PRECISION

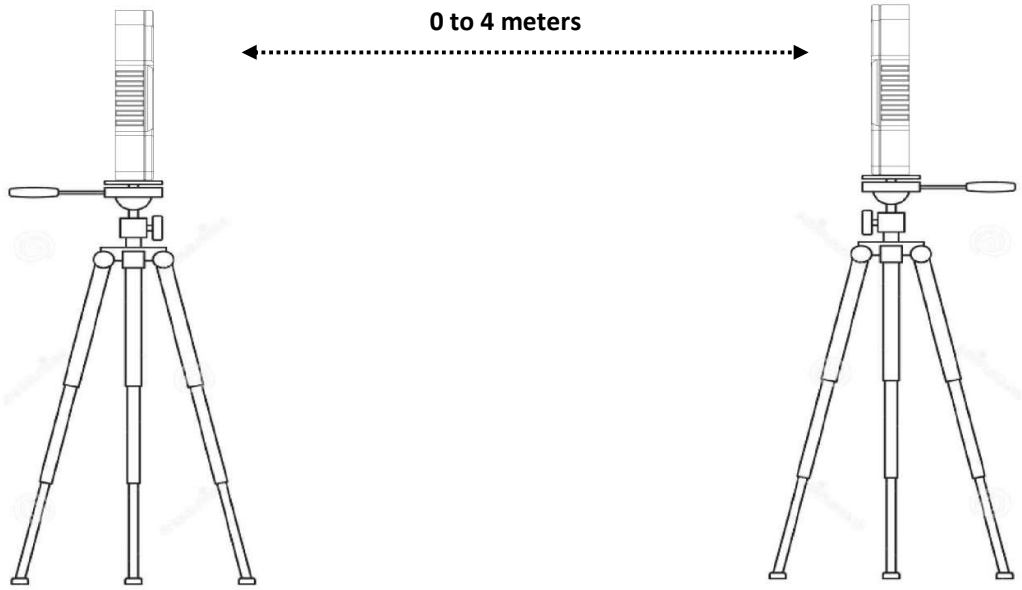
The precision of the photocells is 1 ms (0.001s).

DEAD TIME

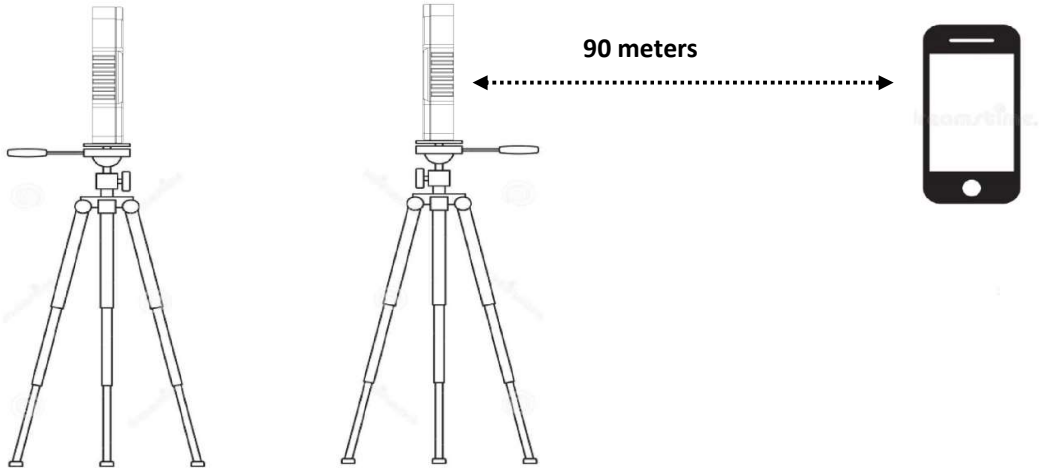
Dead time is the minimum time that must elapse between two consecutive shots from the same barrier. Don't confuse it with precision. The minimum dead time of the receiver is 0.05 seconds. However, such a low dead time has no utility in physical evaluation tests, which is why the app only accepts dead times of 1 sec or 2 sec. The meaning and use of dead time will be explained in the PROBATIO app video.To reduce unwanted shots, you must choose the photocell height well, generally at chest or neck height of the athletes to avoid cutting with arms or legs.

OPTICAL RANGE

The maximum recommended separation between the emitter and receiver is 4 meters. They can normally be aligned in a few seconds at about 4 meters (13 feet). You can try greater distances up to 8 or 10 meters (about 30 feet), but the alignment must be more precise to avoid false shots by very small objects like insects, rain, dust, leaves, direct sunlight, etc.



WIRELESS RANGE



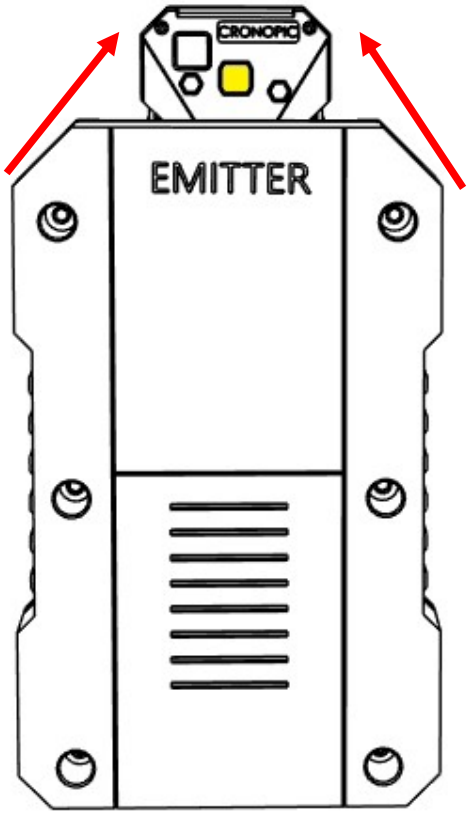
EMITTER **RECEIVER**

The maximum recommended distance between the receiver and mobile device is 90 meters (300 feet). This distance could be reduced in very humid environments, or if there are obstacles between the receiver and mobile device, or if the photocell is very close to the ground.If for example you want to evaluate a 100-meter sprint test, the optimal position of the mobile device would be at the middle of the route, so that the distance between the mobile device and each receiver is about 50 meters (160 feet).

ALIGNMENT

Even if the alignment light is off (which means the photocells are aligned), that doesn't mean they are WELL aligned.To make a good alignment follow these steps:

1. Interrupt the barrier near the receiver with a thin stick of about 3mm to 4mm (1/8'' to 5/32''). If the barrier is correctly aligned, the photocell should not fire, that is, the alignment light should not turn on. The alignment is ready, otherwise continue with step 2.
2. Adjust your emitter tripod parallel to the ground (use your tripod's bubble if it has one). Then adjust your receiver to the same height, and using the two axes of your tripod, point the receiver toward the emitter as you would with a rifle. Do the test from step 1 until the alignment is ready. The large central yellow window of each device (emitter and receiver) must be aligned.



OTHER TIPS

1. Imagine the infrared barrier as if it were an elastic rope. The more you stretch the rope, the thinner and weaker it becomes and therefore easier to cut. If it passes the test from step 1, it means the infrared barrier is strong and there will be no false shots caused by small objects, dust, rain and insects. Of course, the smaller the separation of the photocells, the easier the alignment process will be.
2. Avoid as much as possible having the receiver in direct position toward the sun, when the sun is very low, such as the sunset sun, to avoid false shots. The barrier should work the same even in those conditions, but the alignment should be very good and even so false shots are more likely to occur. In that case simply exchange the position of the emitter with the receiver.